

# Surveying the Prevalence of Lower Urinary Tract Symptoms Based on Individual and Clinical Parameters in Patients with Multiple Sclerosis

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## Research article

**Keywords:** Multiple sclerosis, prevalence, urinary symptoms

**Posted Date:** June 21st, 2019

**DOI:** <https://doi.org/10.21203/rs.2.10499/v1>

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**Version of Record:** A version of this preprint was published on January 17th, 2020. See the published version at <https://doi.org/10.1186/s12883-019-1582-1>.

# Abstract

**Background** Most patients with multiple sclerosis (MS) suffer from bladder dysfunction during the course of the disease. This study was conducted to examine the prevalence of these complications among patients with MS. **Methods** This cross-sectional study was performed on 603 patients with MS who referred to the neurology clinics of Kashani and Alzahra Hospitals affiliated to Isfahan University of Medical Sciences, Isfahan, Iran. The sampling was performed by multi-stage random cluster sampling method and the informed consent form was filled in by the subjects. Then, all the data were collected through interviews using the Lower Urinary Tract Symptom Score (LUTSS) developed in accordance with the definitions presented by the International Continence Society (ICS) and the International Prostate Symptom Score (IPSS). The data were analyzed using descriptive and inferential statistical tests in SPSS and the significance level was considered to be less than 0.050. **Results** The prevalence rate of lower urinary tract symptoms (LUTS) was 87.6% among all the subjects, with a similar rate among women (88.0%) and men (86.0%). There was a significant difference between the two groups of men and women in terms of the prevalence of stress urinary incontinence (SUI), intermittent urine flow, hesitancy, straining, and dribbling ( $P < 0.050$ ). There was no significant difference between the two groups of women and men in terms of the prevalence of other symptoms ( $P > 0.050$ ). Moreover, there was a significant difference between the degree of LUTS with age, marital status, education, duration of illness, clinical course, and disability ( $P < 0.05$ ). **Conclusions** A high prevalence of LUTS was found among patients with MS, with similar rates in men and women, and the nature of the urinary complaints and LUTS was different among men and women with MS. Therefore, it is recommended that the health system take necessary measures regarding timely detection and treatment of LUTS among these patients in order to prevent secondary outcomes and improve the quality of life (QOL) of patients with MS.

## Background

In developed countries, multiple sclerosis (MS) is the most prevalent chronic neurological disorder among young individuals, with an incidence rate of more than 400 thousand people in the United States<sup>[1]</sup> and 500-700 thousand people in Europe.<sup>[2]</sup> Based on a previous study, the incidence rate of this disease in Iran is estimated to be between 5.3 and 74.28 per 100 thousand people.<sup>[3]</sup> Several studies have reported that the majority of patients with MS suffer from lower urinary tract symptoms (LUTS), which are among the most common debilitating social manifestations of the disorder, are often ignored,<sup>[4]</sup> and are a major source of morbidity and financial burden for these patients.<sup>[5]</sup> An overview of the Multiple Sclerosis Association of America (MSAA) showed that 50-65% of patients with MS had a mild disability complain of at least one moderate to severe LUTS, and LUTS is the first symptom of the disease in 2 to 14% of patients with MS.<sup>[6]</sup>

The rate of urinary complications in patients with MS is significantly higher in comparison to the general public.<sup>[5]</sup> In a study on 1047 patients with MS, 92% reported at least one LUTS, and the symptoms with the highest incident rates included dribbling (64.0%), urgency (62.0%), and feeling of incomplete emptying (61.0%).<sup>[7]</sup> However, in several other studies, the incidence of LUTS in patients with MS was approximately 75.0%, with the incidence of urgency, polyuria, and urgent incontinence reported, respectively, as 24.0-86.0%,

17.0-65.0%, and 34.0-72.0% of patients with LUTS. Urinary hesitancy is common and its prevalence has been reported as 25.0-49.0%, and its incidence rate is higher among men.<sup>[8]</sup> In addition, the incidence of stress urinary incontinence (SUI) has been reported as 16.0-55.9% in patients with MS.<sup>[9]</sup> Overall, previous reports in western countries indicate that stimulatory symptoms (storage phase) are significant urethral symptoms, whereas the incidence of obstructive symptoms (emptying phase) is higher than that of stimulatory symptoms in the east.<sup>[10]</sup>

The nature of the emptying complaint and LUTS varies between the two sexes in patients with MS.<sup>[11]</sup> However, there is little information regarding the difference in urinary findings among men and women or subtypes of the MS disease.<sup>[12]</sup> The results of a study revealed that urinary and urodynamic findings are similar in both sexes, and despite the similar urodynamic findings, patients with relapsing-remitting MS (RRMS) reported more severe LUTS compared to patients with secondary progressive multiple sclerosis (SPMS).<sup>[13]</sup> A small number of evidence indicates that obstructive complaints such as urinary hesitancy, discontinuation or poor flow of urine, and incomplete urination have a higher incidence among men. However, the urinary incontinence complaint is more prevalent among women and stimulatory complaints such as urgency, diurnal and nocturnal polyuria, and pain are identical in both sexes.<sup>[11]</sup>

Several studies have shown that some patients consider these symptoms as a manifestation of the disease. Nevertheless, the extent of these symptoms and their impact on the early stage of the disease are not clear.<sup>[4]</sup> Understanding the characteristics of LUTS may be helpful in the differential diagnosis of various clinical types of MS and in the management of patients with other medical conditions such as stroke, diabetes mellitus (DM), and prostate hypertrophy, which have a known effect on emptying and sexual function. Moreover, such an understanding provides a significant insight into the complicated MS pathophysiology and the mechanism of LUTS in the emergence of MS. These determinants contribute to the management of LUTS and improvement of quality of life (QOL).<sup>[14]</sup> Performing epidemiological studies to evaluate the rate of specific symptoms among individuals with MS helps to describe the economic and social significance of the disease and assists in the identification, early diagnosis, and timely control of the complications of the disease,<sup>[15]</sup> and identification of possible causes of the disorder, in addition to providing the foundation for higher level studies.<sup>[16,17]</sup> Few studies have examined bladder dysfunction despite its significant societal effects on the individuals.<sup>[18]</sup> Therefore, due to the different prevalence of bladder dysfunction in different societies, and the difference observed in the clinical symptoms, emptying dysfunction, and demographic characteristics of patients with MS, and the serious impact of these disorders on QOL, this study was conducted with the aim to determine the incidence of LUTS based on individual and clinical parameters in patients with MS.

## Methods

This cross-sectional study was conducted from 23 August 2017 to 19 April 2018 on 603 patients with MS who referred to the neurology clinic of Kashani and Alzahra treatment centers affiliated to Isfahan University of Medical Sciences, Isfahan, Iran. In this study, the subjects were selected based on multistage random cluster sampling method and the cluster volume was chosen proportional to their population size. The

duration of the disease, sex, and the separated number of men and women were considered as the first class, the second class, and clusters, respectively. In general, using a random number table, the sample size was determined proportional to the size of the men and women clusters. The number of subjects, based on the results of the study of Sand et al.<sup>[19]</sup>, with the prevalence of LUTS ( $P = 0.500$ ), accuracy of 5%, confidence interval of 95%,  $d$  of 0.04, and a drop rate of 10%, was estimated to be 660. From among the selected participants, 38 and 4 patients were excluded from the study due to their unwillingness to continue cooperation and complete the questionnaire, and due to recurrence of MS and corticosteroid therapy, respectively.

The study inclusion criteria included the definitive diagnosis of MS by a neurologist based on the 2010 McDonald criteria<sup>[20]</sup>, age of above 18 years, having a medical record at a referral clinic, physical and mental ability to answer questions (lack of physical or cognitive defects causing inability to answer the questions correctly), resident of Isfahan City, willingness to participate in the study, stable clinical status [lack of progressive recurrence or disability in the past 3 months based on an increase of at least 1 point in the Expanded Disability Status Scale (EDSS) score], and lack of LUTS prior to the onset of MS. In addition, the exclusion criteria included unwillingness to continue cooperation and complete the questionnaire, recurrence of MS in the previous month, and treatment with corticosteroids. After sampling using multistage random cluster sampling method and completion of the informed consent form by the subjects, all the data in this study were obtained through interviews using a three-part questionnaire. The first part of the questionnaire contained 6 questions on demographic data including age, sex, marital status, educational status, occupation, and economic status. The second part included 5 questions on clinical information regarding the duration of the disease, age at the time of diagnosis, EDSS score, type of clinical presentation of MS, and type and duration of use of drugs. The third part included questions about LUTS, which were collected using the Persian translation of the Lower Urinary Tract Symptom Score (LUTSS) based on the definitions presented by the International Continence Society (ICS)<sup>[21]</sup> and International Prostate Symptom Score (I-PSS). The English version of the LUTSS was translated into Persian using forward and backward translation method by two individuals completely fluent in English, and then, its repeatability was evaluated and its Cronbach's alpha coefficient was calculated to be 0.789. LUTSS contains 15 non-gender specific items for all LUTSs (storage, emptying, and post-emptying symptoms) for the comprehensive assessment of LUTS experienced among patients with MS.<sup>[22]</sup> The I-PSS scale includes 7 specific questions associated with urinary and obstructive urinary symptoms and an additional question on general satisfaction with urinary situation that was not used in the scale scoring. Polyuria, urgency, and nocturnal polyuria reflected the stimulatory symptoms (maximum score of 15), and incomplete emptying of the bladder, intermittent urine flow, poor urine flow, and straining at the onset of urination were indicative of obstructive symptoms (maximum score of 20). The items were scored based on a 6-point Likert scale ranging from 0 (no problem) to 5 (always), and the symptom scoring was based on the frequency scale ranging from 0 to 5 with a total score range of 0-35. The total score was calculated through adding up the scores of the 7 urinary questions, with scores of 0-7, 8-19, and 20-35 representing a lack of symptoms or presence of mild symptoms, moderate symptoms, and severe symptoms, respectively. In the current study, the Persian version of the I-PSS questionnaire by Panahi et al. was exploited. They showed that with a Cronbach's alpha value of 0.7, an intra-class correlation coefficient (ICC) of 0.87, and Pearson product-moment correlation coefficient of 0.92,

this questionnaire was a valid and reliable scale and could be used as a symptom-based questionnaire in the Iranian population. [23]

The collected data were analyzed using descriptive statistics [mean and standard deviation (SD), percentage, and frequency of variables], and inferential statistics including chi-square test, independent t-test, and analysis of variance (ANOVA) test in the SPSS software (version 18, SPSS Inc. Chicago, IL, USA). Moreover, the significance level was considered to be less than 0.05.

## Results

This study included 603 patients with MS. The mean and SD of the age of the participants, duration of MS, age at onset of MS, and disability score were  $35.45 \pm 9.08$  years,  $7.63 \pm 5.56$  years,  $26.85 \pm 7.81$  years, and  $2.45 \pm 2.11$ , respectively. In addition, 71.6%, 76.1%, 33.7%, and 37.8% of the patients had mild disability, a clinical recurrence and recovery period, treatment with beta interferons, and associated illnesses, respectively. Moreover, 78.6%, 68.8%, 40.5%, and 21.2% of the subjects were women, married, had university degrees, and were employed, respectively (Table 1).

The prevalence of LUTS was 87.6%, with a similar rate among women (88.0%) and men (86.0%). Furthermore, 18.7% of patients reported experiencing LUTS only in the acute phase and recurrence of the disease. The most commonly reported symptoms among all subjects based on the definitions by the ICS were nocturnal polyuria (59.2%) and urgency (57.0%) in the storage phase, urinary hesitancy (39.6%) and intermittent urine flow (36.0%) in the emptying phase, and feeling of incomplete emptying in the post-emptying phase (43.1%) (Table2).

Symptoms with the highest prevalence among women were, respectively, nocturia (61.0%) and urgency (57.8%) in the storage phase, hesitancy (35.7%) and intermittent urine flow (33.8%) in the emptying phase, and feeling of incomplete emptying in the post-emptying phase (42.6%). Among men, symptoms with the highest prevalence included urgency (54.3%) and nocturia (52.7%) in the storage phase, hesitancy (54.3%) and intermittent urine flow (44.2%) in the emptying phase, and feeling of incomplete urine emptying in the post-emptying phase (45.0%). Symptoms of bladder pain and burning sensation while urinating were common among 17.74% and 18.6% of women and men, respectively. The prevalence of SUI symptoms was, respectively, reported as 33.5% and 15.5% among women and men, and the chi-square test showed a significant difference between the two groups ( $P < 0.001$ ). Moreover, this test showed a significant difference between the two groups of men and women in terms of the prevalence of intermittent urine flow, urinary hesitancy, straining, and dribbling ( $P < 0.050$ ). There was no significant difference between the two groups of men and women in terms of the prevalence of other symptoms ( $P > 0.050$ ) (Table 2).

The prevalence of the times intermittent urine flow, frequency, and straining at the onset of urination was not similar between men and women, and the chi-square test indicated significant differences between the two groups ( $P < 0.050$ ). However, there was no significant difference between the two groups of men and women in terms of the prevalence of other symptoms ( $P > 0.050$ ) (Table 3).

The prevalence of mild, moderate, and severe LUTS was 56.3%, 12.5%, and 6.2% in the < 20 years age group, 45.1%, 25.4%, and 5.8% in the 20-30 years age group, 44.9%, 33.6%, and 8.1% in the 30-40 years age group, and 37.1%, 40.7%, and 12.2% in the 40-50 years age group, respectively. The chi-square test showed a significant difference between the four groups in this regard ( $P = 0.002$ ). Furthermore, the mean age of the patients with mild, moderate, and severe LUTS was  $34.50 \pm 7.87$ ,  $37.51 \pm 7.98$ , and  $37.60 \pm 8.33$  years, respectively, and ANOVA showed a significant difference between age and degree of LUTS ( $P \leq 0.001$ ). The prevalence of mild, moderate, and severe LUTS was, respectively, 44.1%, 33.8%, and 6.7% among women and 39.5%, 28.7%, and 14.7% among men, and the chi-square test indicated a significant difference between the two groups ( $P = 0.020$ ). This rate was 40.7%, 29.3%, and 7.8% among the single individual, 45.1%, 33.0%, and 7.4% among the married subjects, and 31.6%, 42.1%, and 18.4% among the divorced and dead subjects, respectively, and the chi-square test showed significant differences among the three groups ( $P = 0.040$ ). The prevalence of mild, moderate, and severe LUTS was, respectively, 32.8%, 48.3%, and 11.0% in the group with pre-diploma degree, 51.5%, 28.0%, and 6.5% in the group with a high school diploma, and 42.2%, 27.5%, and 8.6% in the group with an academic degree, and the chi-square test showed a significant difference among the three groups ( $P < 0.001$ ) (Table 4).

The prevalence rate of mild, moderate, and severe LUTS was 49.8%, 26.8%, and 3.9% in the group with duration of illness of < 5 years, 42.9% 33.5%, and 7.1% in the group with duration of illness of 5-10 years, and 33.8%, 40.0%, and 16.8% in the group with duration of illness of > 10 years, respectively. The chi-square test revealed a significant difference among the three groups in this respect ( $P < 0.001$ ). In addition, this rate was 49.1%, 25.9%, and 5.3% in the group with mild disability, 28.5%, 50.5%, and 14.6% in the group with moderate disability, and 25.0%, 45.0%, and 15.0% in the group with severe disability, respectively, and the chi-square test indicated a significant difference among the three groups ( $P < 0.001$ ). Finally, the prevalence of mild, moderate, and severe LUTS was 50.0%, 17.9%, and 0.0% in the group with clinically isolated syndrome (CIS), 46.8%, 28.8%, and 7.0% in the group with recurrence and recovery, and 26.7%, 51.7%, and 16.4% in the group with a severe clinical course, respectively, and the chi-square test showed a significant difference among the three groups ( $P < 0.001$ ) (Table 4).

## Discussion

The findings of this cross-sectional study were indicative of the high incidence of LUTS among patients with MS; 87.6% of patients had LUTS with similar prevalence rates among men and women. In this regard, the overall incidence of LUTS in the studies by Khalaf,<sup>[24]</sup> Onal,<sup>[25]</sup> and Nakipoglu<sup>[26]</sup> was, respectively 92.0%, 93.0%, and 80.8%. Khalaf reported a similar incidence among women (93.0%) and men (91.0%).<sup>[24]</sup> Moreover, a review study revealed that LUTSs were common among patients with MS and 80-100% of patients suffer from LUTSs during the course of the MS disease.<sup>[27]</sup>

In the present study, the highest rates of LUTSs reported among all of the subjects were related to nocturia, urgency, diurnal polyuria, and feeling of incomplete urine emptying, respectively. A study on 9700 patients with MS revealed that nocturia and urgency were, respectively, the most prevalent LUTSs in these patients.<sup>[28]</sup> In a study, the incidence of polyuria, straining, nocturnal polyuria, urgency, urinary incontinence, urinary discontinuation, and feeling of incomplete urine emptying among patients with MS was reported to be

61.9%, 50.0%, 47.6%, 47.6%, 38.0%, 30.9%, and 28.5%, respectively.<sup>[29]</sup> In several studies, the incidence of urgency, polyuria, urgent incontinence, and urination hesitance was reported, respectively, to be 24.0-86.0%, 17.0-65.0%, 34.0-72.0%, and 25.0-49.0% among patients with MS and LUTS.<sup>[8]</sup> The findings of other investigations showed that the most prevalent symptoms were dribbling (64.0%), urgency (62.0%), and feeling of incomplete emptying (61.0%).<sup>[7]</sup> However, the rate of dysuria in the current study (14.6%) was similar to that in the study by Nakipoglu et al. (13.0%), but was lower in comparison to the previous studies by Goldstein, and Wheeler as respectively 28.0% and 36.0%.<sup>[30,31]</sup>

A review study showed that the storage symptoms of urgency and nocturia were the main symptoms of LUTS, with incidence rates of more than 50.0% among the subjects, and the prevalence of poor urine flow, urinary discontinuation, and feeling of incomplete urinary emptying with rates of 50.0%, 46.6%, and 43.3%, respectively, was higher.<sup>[32]</sup>

In the present study, the nature of the emptying complaints and LUTS in patients with MS varied between the two sexes, so that the most prevalent symptoms reported among women were nocturnal polyuria, followed by urgency, and incomplete urine emptying, and SUI with a rate of 33.5% was more prevalent among women compared to men. There was a significant statistical difference between the two groups. Maruland et al. reported that SUI was the most prevalent type of incontinence among women, with values of 31.4% and 16.0% in other studies.<sup>[9, 34]</sup>

In the present study, the most prevalent symptoms reported in men included urgency, urinary hesitancy, nocturia, and feeling of incomplete urinary emptying, respectively. Moreover, the incidence of symptoms of intermittent urine flow, urinary hesitancy, straining, and dribbling among men was higher in comparison to women and there was a significant difference between the two groups. In this regard, a study revealed that obstructive complaints such as urinary hesitancy, discontinuity or poor flow of urine, and incomplete urinary emptying were found most often among men, whereas SUI complaints were more common among women.<sup>[29]</sup> They found stimulatory complaints including urgency, diurnal and nocturnal polyuria, and pain in both sexes.<sup>[29]</sup> A study in Japan reported that polyuria was the most prevalent symptom among men (94.8%), followed by a poor flow (92.0%), diurnal polyuria (88.2%), and urgency (70.0%).<sup>[35]</sup>

In the current study, the frequency of symptoms of intermittent urinary flow and straining at the onset of urination were more prevalent among men compared to women more than half the time, whereas the frequency of diurnal polyuria symptom was higher in women than men less than half the time and the difference was significant. The study by Donovan et al. indicated that urinary symptoms in the emptying phase were more prevalent in patients with MS and LUTS symptoms.<sup>[35]</sup>

The results of the current study showed that the mean age of the subjects with severe symptoms was higher in comparison to those with mild and moderate symptoms. In addition, the prevalence of mild urinary symptoms was higher in the age group under 40 years, whereas the prevalence of moderate and severe LUTS among patients with MS was higher in the age group of above 40 years. In general, with increasing age, the incidence of moderate and severe LUTS increased in patients with MS. Kaplan et al found that the

incidence of LUTS increases with age among men and women.<sup>[36]</sup> The incidence of the urgency and nocturnal polyuria symptoms was also found to increase with increasing age.<sup>[35]</sup>

In this study, the prevalence of severe LUTS among men was higher compared to women. In this regard, in a study, 79.0% of men and 49.0% of women were reported to have moderate to severe symptoms based on the I-PSS scale.<sup>[4]</sup> Moreover, in the current study, the prevalence of moderate and severe LUTS among individuals with a pre-diploma education and illiterate individuals was higher than those with diploma university degree, and there was a significant difference between the individual variables of age, sex, marital status, and severity of urinary symptoms in this regard.

Furthermore, in this study, the estimated incidence of severity of LUTS varied depending on the duration of the disease, the severity of disability, and the clinical course. With increased duration of the disease for more than 10 years, the prevalence of moderate and severe LUTS increased in patients with MS. Moreover, the incidence of severe LUTS among patients with MS and severe disability was higher than those with mild to moderate disability. In this regard, the results of a study showed that the prevalence of LUTS increased with increase in the duration of the disease, as an average of 35.0-39.0% of the patients reported the onset of the disease after 5-6 years; in contrast, 64% of the patients with a 17.1-year history of the disease reported LUTS.<sup>[37,38]</sup> However, the study by Khalf indicated that despite the increasing incidence of LUTS with the progress of the disease, these symptoms were not basically related to the duration of the disease or degree of disability.<sup>[7]</sup> In addition, in the study by Nakipoglu, there was no correlation between LUTS and characteristics of the disease.<sup>[26]</sup> It was found in another study that disability and LUTS were correlated ( $r = 0.24$ ,  $P = 0.090$ ).<sup>[4]</sup>

Furthermore, in the current study, the incidence of severe LUTS among patients with MS with a progressive clinical course was higher than those with CIS and recurrence. In the same vein, in a study by UKKONEN, it was found that patients with progressive MS had a higher incidence of urinary disorders in comparison to other clinical patterns.<sup>[39]</sup> In addition, the study by Cohert showed that, despite the similarity of urodynamic findings, patients with RRMS reported more severe urinary symptoms in comparison to those with SPMS.<sup>[40]</sup>

## Conclusion

A high prevalence of LUTS was found among patients with MS with similar incidence rates among men and women. However, the nature of emptying complaints and LUTS differed among women and men with MS, so that the incidence of intermittent urine flow, urinary hesitancy, straining, and dribbling was higher in men in comparison to women. In addition, the incidence of severe LUTS in men was higher than women; however, SUI among women was more than men. There was a correlation between the individual variables (age, sex, marital status, occupation) and the severity of LUTS. Furthermore, the estimated incidence of the severity of LUTS varied depending on the duration of the disease, severity of disability, and the clinical course. Thus, patients with progressive MS had higher incidence of moderate and severe LUTS in comparison to those with other clinical patterns; in addition, with increasing duration of the disease and severity of disability, the incidence of moderate and severe LUTS increased in patients with MS. Therefore, given the high prevalence of LUTS in patients with MS, it is recommended that the health system take necessary measures regarding

the timely detection and treatment of LUTS among these patients. The identification and timely diagnosis of these cases can greatly contribute to treating these patients, reducing their imposed costs, preventing secondary outcomes, and improving the QOL of patients with MS.

The strengths of this study included the appropriate sample size and observance of the women to men population ratio based on the ratio of MS incidence within the society. Since the research was based on the patient's own statements regarding the LUTS, the memory capacity of the subjects to recall their past information was among the limitations of the current study. Moreover, mental preoccupations and everyday issues as well as factors such as fatigue, economic and family issues, or the presence of the inquirer during completing the questionnaire could affect the way in which the subjects responded to the questions of the questionnaire.

## Abbreviations

MS: Multiple sclerosis; LUTS: lower urinary tract symptoms; QOL: quality of life; IPSS: International Prostate Symptom Score; EDSS: Expanded Disability Status Scale; MSAA: Multiple Sclerosis Association of America; SUI: Stress urinary incontinence; QOL: Quality of life

## Declarations

### **Ethics approval and consent to participate**

This research was approved by the Ethics Committee of Isfahan University of Medical Sciences No. 394911. Then, written informed consent was obtained from all patients.

**Consent for publication:** Not applicable

**Availability of data and material:** Not applicable

**Competing interests:** Not applicable

**Funding:** Not applicable

### **Authors' contributions;**

Mrs. FN contributed primarily to the Conception, Design, interview, analyzing, and interpreting the data and writing the manuscript.

Dr. VSH contributed in the design, Data interpretation, manuscript writing and editing and supervision and final approval of the version to be published,

Dr.MMS and Dr VH participated in the design and have been involved in Manuscript review and editing,

Dr MMG contributed in designing of the study and statistical analysis, and all authors have read and approve the final version of manuscript.

## Acknowledgments

This study is part of the research project approved with No. 394911. The kind cooperation of the deputy of research of Isfahan University of Medical Sciences, deputy chairman of the School of Medicine and its deputy of research, the deputy chairman of Kashani and Alzahra hospitals, the authorities of Kashani and Alzahra hospitals, and the participants of the study is sincerely appreciated

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## Tables

Table 1. Demographic and Clinical Characteristics of subjects

<b>Parameter</b>		<b>Parameter</b>	
<b>Age (year)</b> Mean (SD)	35.45 (8.08)	<b>EDSS Score</b> Mean (SD)	2.45 (2.11)
<b>Disease Duration</b> Mean (SD)	7.63 (5.56)	<b>EDSS Class</b> No (%)	
<b>Age of onset of disease</b> Mean (SD)	26.85 (7.81)	(1-3)	432 (71.6)
<b>Sex</b> No (%)		(3.5-6.6)	151 (25)
Female	474 (78.6)	( ≥ 7)	20 (3.4)
Male	129 (21.24)	<b>MS Type</b> No (%)	
<b>Marital status</b> No (%)		Relapsing remitting	459 (76.1)
Single	150 (24.9)	Primary progressive	19 (3.2)
Married	415 (68.8)	Secondary progressive	97 (16.1)
Divorced and widowed	47 (6.3)	CIS	28 (4.6)
<b>Education level</b> No (%)		<b>MS medication</b> No (%)	
Pre-high school education	145 (24)	Interferon beta	203 (33.7)
high school diploma	214 (35.5)	Glatiramer acetate	47 (7.8)
University degree	244 (40.5)	Fingolimod	114 (18.9)
<b>Job status</b> No (%)		Natalizumab injection	41 (6.8)
Employed	128 (21.2)	Azathioprine	20 (3.3)
Unemployed	52 (8.6)	Ritoximab injection	97 (16.1)
housewife	378 (62.7)	Mitoxantrone	1 (0.2)
Retired and disabled	45 (7.5)	Dimethylfumarat	13 (2.2)
		Trifulonumaide	4 (0.7)

		Mix (Azathioprine + Interferon beta)	24 (4)
		Cyclophosmaide	8 (1.3)
		Metotruxat	3 (0.5)
		None	28 (4.6)
		<b>Current comorbid conditions</b>	
		No (%)	
		Diabetes	7 (1.2)
		Arthritis	8 (1.3)
		Hypertension	17 (2.8)
		Heart disease	5 (0.8)
		Thyroid disorders	40 (6.6)
		Migraine	37 (6.1)
		Asthma	8 (1.3)
		Inflammatory bowel disease	9 (1.5)
		kidney disease	14 (2.3)
		Liver disease	4 (0.7)
		infectious disorders	2 (0.3)
		Skin disorders	2 (0.3)
		Epilepsy	11 (1.8)
		Other disorders	64 (10.6)
		None	375 (62.1)

SD: Standard deviation; EDSS: Expanded Disability Status Scale

**Table 2.** Prevalence of lower urinary tract symptoms during the previous week among all the subjects and women & men

LUTS No (%)	Total	Women	Men	P
	528 (87.6)	417 (88)	111 (86)	0.555
<b>Storage symptoms</b>				
daytime frequency (Patient who considers that he/she urinates too often by day)	249 (41.3)	202 (42.6)	47 (36.4)	0.206
Nocturia (Waking up at night one or more times to urinate)	357 (59.2)	289 (61.0)	68 (52.7)	0.091
Urgency (A sudden compelling desire to urinate)	344 (57.0)	274 (57.8)	70 (54.3)	0.471
Urgency urinary incontinence (Involuntary leakage of urine accompanied by or immediately preceded by sudden need to rush to urinate)	217 (36.0)	173 (36.5)	44 (34.1)	0.616
Enuresis (involuntary urination)	19 (3.2)	188 (39.7)	45 (34.9)	0.323
Stress urinary incontinence (Involuntary leakage of urine on effort or exertion, or on sneezing or coughing)	179 (29.7)	159 (33.5)	20 (15.5)	< 0.001
Leakage of urine during sexual activity	77 (2.8)	15 (3.2)	2 (1.6)	0.451
Nocturnal enuresis (Leakage of urine occurring during sleep)	33 (5.5)	24 (5.1)	9 (7.0)	0.397
<b>Voiding symptoms</b>				
Weak/slow stream (Perception of weak/reduced urine flow, usually compared with previous performance)	171 (28.4)	131 (27.6)	40 (31.0)	0.451
Split stream (Splitting or spraying of the urine stream may be reported)	159 (26.0)	129 (27.2)	30 (23.3)	0.366
Intermittent urine stream (Urine flow stops and starts on one or more occasions during micturition)	217 (36.0)	160 (33.8)	57 (44.2)	0.029
Hesitancy (Difficulty in initiating urination resulting in a delay in the onset of urination after the individual is ready to pass urine)	239 (39.6)	169 (35.7)	70 (54.3)	< 0.001
Straining (Muscular effort used to either initiate, maintain, or improve the urinary stream)	153 (25.4)	106 (22.4)	47 (36.4)	0.001
Terminal dribble (A trickle or dribble at the end of the urine flow)	-	-	-	-
<b>Post-micturition symptoms</b>				
Feeling of incomplete emptying (Feeling that the bladder is not empty after urination)	260 (43.1)	202 (42.6)	58 (45.0)	0.633
Post-micturition dribble (Involuntary loss of urine immediately after an individual has finished passing urine)	171 (28.4)	124 (26.2)	47 (36.4)	0.022
<b>Other genitourinary symptoms</b>				
Bladder pain (Pain or discomfort in the bladder area)	106 (17.6)	84 (17.7)	22 (17.1)	0.860
Dysuria (Burning sensation during urination)	88	64	24	0.146

LUTS: lower urinary tract symptoms;

- Data was presented as frequency (percentage). P-values were derived from chi-square test.

**Table 3.** Comparison of prevalence of times lower urinary tract symptoms among women and men with multiple sclerosis based on the International Prostate Symptom Score

P	More than half the time No (%)	Less than half the time No (%)	Not at all No (%)	Sex	I-PSS
0.416	128 (27.0)	146 (30.8)	200 (42.2)	Women	Urgency
	38 (29.5)	32 (24.8)	59 (45.7)	Men	
0.048	150 (31.6)	52 (11.0)	272 (57.4)	Women	Frequency
	42 (32.6)	5 (3.6)	82 (63.6)	Men	
0.230	42 (8.9)	247 (52.1)	185 (39.0)	Women	Nocturia
	9 (7.0)	59 (45.7)	61 (47.3)	Men	
0.687	80 (16.9)	122 (25.7)	272 (57.4)	Women	Feeling of incomplete emptying
	26 (20.2)	32 (24.8)	71 (55.0)	Men	
0.011	86 (18.1)	74 (15.6)	314 (66.2)	Women	Intermittent urine stream
	39 (30.2)	18 (14.0)	72 (55.8)	Men	
0.001	57 (12.0)	49 (10.3)	368 (77.6)	Women	Straining
	31 (24.0)	16 (12.4)	82 (63.6)	Men	
0.360	68 (73.114.3)	63 (13.3)	343 (72.4)	Women	Weak/slow stream
	25 (19.4)	15 (11.6)	89 (69.0)	Men	

I-PSS: International Prostate Symptom Score

Data was presented as frequency (percentage). P-values were derived from chi-square test.

**Table 4.** Comparison of prevalence of lower urinary tract symptoms in terms of individual and clinical characteristics based on the International Prostate Symptom Score

P	Severe (n=51)	Moderate (n=197)	Mild (n=260)	No symptoms (n=95)	Age group (year) No (%)
0.002	1 (6.2)	2 (12.5)	9 (56.3)	4 (25.0)	< 20
	10 (5.8)	44 (25.4)	78 (45.1)	41 (23.7)	20-30
	20 (8.1)	83 (33.6)	111 (44.9)	33 (13.4)	30-40
	20 (12.0)	68 (40.7)	62 (37.1)	17 (10.2)	40-50
< 0.001	37.60 (8.33)	37.51 (7.98)	34.50 (7.87)	32.63 (7.48)	<b>Age (year)Mean (SD)</b>
					<b>SexNo (%)</b>
0.028	32 (6.7)	160 (33.8)	209 (44.1)	73 (15.4)	Female
	19 (14.7)	37 (28.7)	51 (39.5)	22 (17.1)	Male
					<b>Marital Status No (%)</b>
0.041	13 (8.7)	44 (29.3)	61 (40.7)	32 (21.3)	Single
	31 (7.4)	137 (33)	187 (45.1)	60 (14.5)	Married
	7 (18.4)	16 (42.1)	12 (31.6)	3 (7.9)	Divorced and Widowed
< 0.001					<b>Education level No(%)</b>
	16 (11)	70 (48.3)	47 (32.4)	12 (8.3)	Pre-high school degree
	14 (6.5)	60 (28)	110 (51.5)	30 (14)	High school diploma
	21 (8.6)	67 (27.5)	30 (42.2)	3 (21.7)	University degree
					Duration of disease (year)
< 0.001	9 (3.9)	62 (26.8)	115 (49.8)	45 (19.5)	< 5
	15 (7.1)	71 (33.5)	91 (42.9)	35 (16.5)	5-10
	27 (16.8)	64 (40)	54 (33.8)	15 (9.4)	> 10
					<b>EDSS No (%)</b>
< 0.001	23 (5.3)	112 (25.9)	212 (49.1)	85 (19.7)	1-3
	25 (14.6)	76 (50.5)	43 (28.5)	7 (4.6)	3.5-6.5
	3 (15)	9 (45)	5 (25)	3 (15)	≤ 7
					<b>Course diseaseNo (%)</b>
< 0.001	32 (7)	132 (28.8)	215 (46.8)	80 (17.4)	Relapsing remitting
	19 (16.4)	60 (51.7)	31 (26.7)	6 (5.2)	Progressive

	0 (0.0)	5 (17.9)	14 (50)	9 (32.1)	CIS
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EDSS: Expanded Disability Status Scale; CIS: clinically isolated syndrome

-Values are means  $\pm$  SD; P-value resulted from one-way ANOVA